

CLAIMS

1. Grinding balls made of fritted ceramic comprising the following components (in % by weight):

- 18 to 50% mullite ( $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ )

5 - 9 to 25% zirconia ( $\text{ZrO}_2 + \text{HfO}_2$ ) stabilised by 0.5 to 3% of rare earth oxides

- 25 to 72% alumina ( $\text{Al}_2\text{O}_3$ ).

2. Grinding balls made of fritted ceramic as in Claim 1, wherein said components are mainly obtained from  
10 raw materials comprising zircon ( $\text{ZrSiO}_4$ ) and alumina ( $\text{Al}_2\text{O}_3$ ).

3. Grinding balls made of fritted ceramic as in Claim 1, wherein said ceramic further comprises 1 to 5% by weight of oxides selected from the group of  $\text{Na}_2\text{O}$ ,  $\text{MgO}$ ,  $\text{CaO}$  and  $\text{BaO}$ .

15 4. Grinding balls made of fritted ceramic as in Claim 1, wherein said zirconia is stabilised by 0.5 to 3% by weight of  $\text{Y}_2\text{O}_3$ .

5. Grinding balls made of fritted ceramic as in Claim 1, wherein the chemical analysis (X fluorescence, ICP  
20 plasma spectrometer) of said balls shows the presence of the following oxides (in % by weight):

- 9 to 25%  $\text{ZrO}_2 + \text{HfO}_2$ ,

- 0.5 to 3% rare earth oxides,

- 5 to 12%  $\text{SiO}_2$ ,

25 - 60 to 85%  $\text{Al}_2\text{O}_3$

with a  $\text{ZrO}_2/\text{SiO}_2$  ratio greater than or equal to 2.

6. Grinding balls made of fritted ceramics as in Claim 1, wherein their diameter is between 0.1 and 100mm.

7. Grinding balls made of fritted ceramic as  
30 in Claim 1, wherein their diameter is between 0.5 and 50 mm.

8. Grinding balls made of fritted ceramic as in Claim 1, wherein their diameter is between 0.5 and 10 mm.

9. Method for manufacturing grinding balls made of fritted ceramic as in Claim 1, comprising the following steps:

- mixing and/or grinding the raw materials by dry and/or wet processes in order to form a slurry possibly with binding agents and/or organic surfactants added;
- passing said slurry through a granulation means or process;
- selecting by sieving the balls obtained with the return back to the mixer of the balls of inadequate grain size via a possible drying and/or grinding step;
- drying the balls of correct grain size;
- fritting the balls of correct grain size between 1400°C and 1600°C followed by a packaging step.

10. Method for manufacturing grinding balls made of fritted ceramic as in Claim 9, wherein, during the selection step, the granulation means comprise fluidised-bed granulators and granulation discs.

11. Method for manufacturing grinding balls made of fritted ceramic as in Claim 10, wherein, during the selection step, on the granulator, water fogging on the grinding balls is adjusted so that the balls coming out of the granulation disc comprise between 18 and 22% of water.

12. Method for manufacturing grinding balls made of fritted ceramic as in Claim 9, wherein the granulation methods comprise gelation methods or injection moulding methods.

13. Method for manufacturing grinding balls made of fritted ceramic as in Claim 9, wherein said organic binding agents are selected from the group of polysaccharides, thermoplastic polymers, thermosetting polymers or polymers based on aqueous or organic solvents.

14. Method for manufacturing grinding balls made of fritted ceramics as in Claim 9, wherein said surfactants are chosen from the group of carboxylic acids such

as stearic acid or oleic acid and/or polyelectrolytes such as ammonium polymethylacrylate.

15. Use of the grinding balls made of fritted ceramic as in Claim 1 for grinding mineral or organic  
5 materials.